

oxide, sodium phosphate, yttrium-europium oxide, and mixtures thereof; and the precursor solution includes a precursor material selected from the group consisting of indium methyl (trimethyl) acetyl acetate, tin isopropoxide, tetraethyl orthosilicate, magnesium nitrate, yttrium chloride, europium chloride, sodium phosphate and mixtures thereof.

Remarks/Arguments

Claims 1,3-8 and 10-20 remain in this application. Claim 14 is to be deleted on entry of this amendment.

In reference to the office action, the amendment of 8/15/02 is being objected to on the basis that it introduces new matter. Changes in the paragraph beginning at line 3 on p. 9 of the specification made by amendment of 8/15/02 are to be ignored and another amendment thereof is presented herein wherein the only change that is to be made in that paragraph is the correction of the term "method." The paragraph beginning at line 10 on p. 14 is believed to properly describe as to what happens to the precursor material(s) since lines 14-15 on p. 9 of the specification state explicitly that the coating solution is formed by admixing a diluent with the precursor solution. That is why claims 1 and 13 are to be amended to cover addition of solid particles to a liquid precursor solution since a coating solution is one to which a diluent has been admixed. Adding a diluent is an optional step, as pointed out in line 14 on p. 9 of the specification.

Claims 1,3 and 13-15 stand rejected on the second paragraph of

35 USC 112 as being indefinite. The Examiner contends that the scope of the term "coating material" is unclear in that it is not clear whether it is inclusive or exclusive of the precursor material. Contrary to what was said earlier on this issue, the term "coating material" can be inclusive and exclusive of the precursor material. In the case of sodium phosphate precursor material, the coating material is also sodium phosphate. However, in the case of TEOS precursor, the coating material is silica (SiO_2) and, therefore, is different from the precursor. Hence, the coating material can include precursor but is not limited to that. Furthermore, in all cases, the coating material is different than the precursor solution and coating solution, as should be apparent from the following presentation:

Precursor Material	Precursor/Coating Solution	Coating Material
NaPO_4 (solid)	Na^+ (aqueous) PO_4^- (aqueous)	NaPO_4 (solid)
TEOS (liquid)	TEOS (liquid) + alcohol	SiO_2 (solid)

NaPO_4 in the above table represents all forms of sodium phosphate

Claims 5, 16 and 17 are to be amended to define dilution ratio in the same manner as is recited in claim 4.

Claims 4, 5, 16 and 17 are to be amended to provide that the velocity is in the droplet direction.

The term "integrity" recited in claim 13 is defined in line 16 on p. 14 of the specification.

Claim 14 stands rejected on the first paragraph of 35 USC 112

as being non-enabling for the case wherein the final coating material is the same as the precursor material without the precursor material contacting the substrate particles in the slurry. Applicants disagree with the Examiner on this issue. As is evident from the above table, the precursor/coating material can be one and the same, as in the case of NaPO₄, but the physical state of the precursor in the precursor/coating solution is different. As is obvious for NaPO₄, only Na⁺ ions and PO₄⁻ ions are present in the precursor/coating solution and not solid NaPO₄ coating/precursor material.

It is believed that rejection of claim 20 on the first paragraph of 35 USC 112 will be overcome on entry of this amendment whereby claim 20 will be amended to include sodium phosphate as a precursor material. As noted in lines 6-9 on p. 10 of the specification, suitable precursor materials include any precursor that can be dissolved in an aqueous or non-aqueous liquid. Furthermore, claim 20 already recites that sodium phosphate can be the coating material, which means only one thing to a person skilled in the art: that the precursor is sodium phosphate.

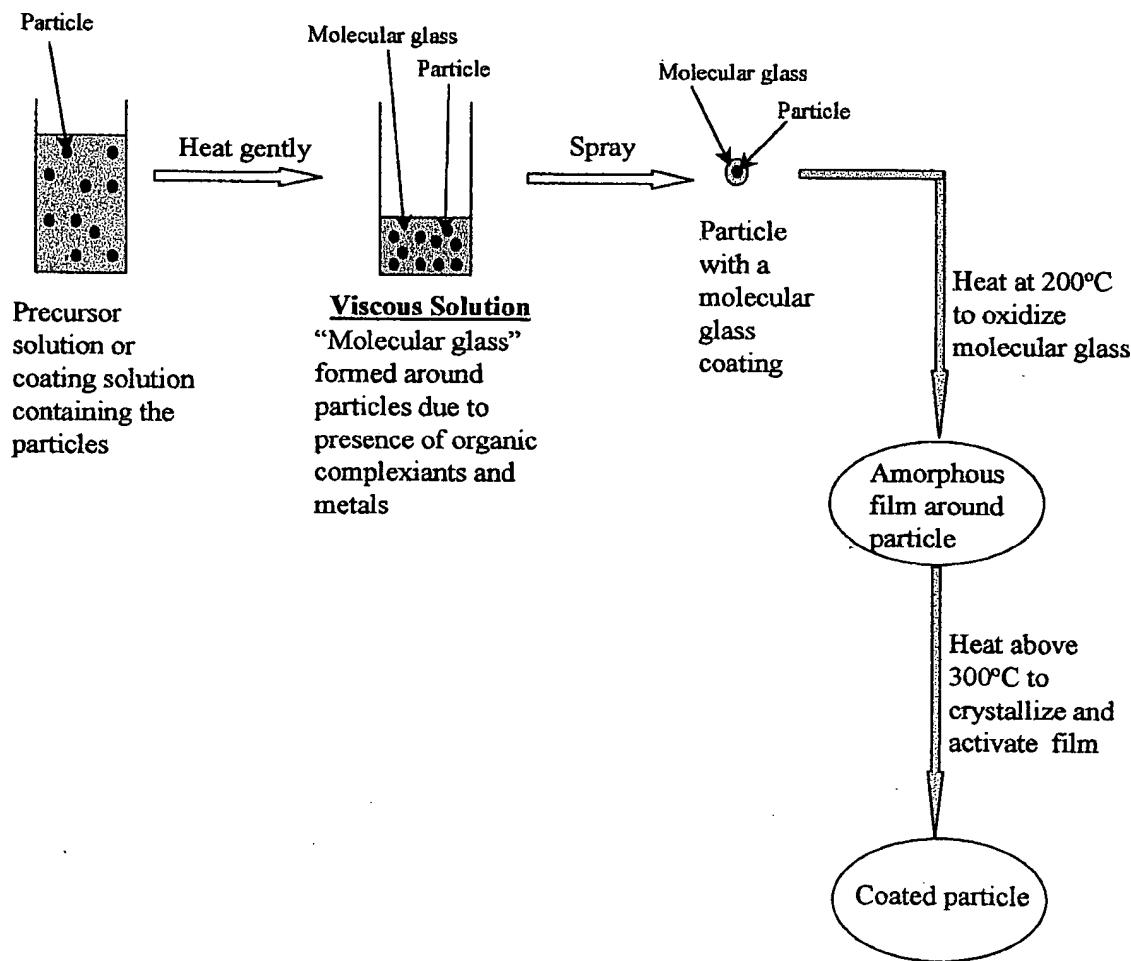
Claims 1,13 and 14 stand rejected on 35 USC 102(b) as being anticipated by the Petersen reference. These claims contain the limitation that the precursor is not precipitated until after spraying. In col.6 circa line 36, the Petersen reference teaches the removal of water from the precursor solution to increase viscosity of the solution. This is not done here. Anyone skilled in

this art knows that the "viscous solution" is a polymeric or a colloidal gel. This fact is supported by disclosure in the Petersen reference in lines 33-34 of col.6, which teaches the addition of urea and carbohydrazide which are well known agents that specifically promote gelation or precipitation.

Claims 1,3,13 and 14 in paragraph 12 of the office action; claims 3-8,12 and 15-19 in paragraph 13; claims 3-8,12 and 15-19 in paragraph 14; claims 10 and 20 in paragraph 15; claims 10 and 20 in paragraph 16; claim 11 in paragraph 17; and claim 11 in paragraph 18 are rejected on 35 USC 103(a) as being unpatentable over combination of prior art references all of which contain the Petersen reference. As already argued, the Petersen reference does not disclose anything that would render the herein-claimed method obvious, alone or in combination with any of the other applied references. A side-by-side comparative color chart of the Petersen reference method and the herein-claimed NRL method, given to the Examiner during the interview on July 30,2002, shows formation of the coating material on the particle after the spraying step in the NRL method and formation of the coating material on the particle prior to the spraying step in the Petersen method, which difference results in unexpected advantages which are of record. Independent claims 1 and 13 were amended to focus on this difference by reciting that the precursor was not precipitated until after the spraying step. Furthermore, it is believed that the Petersen reference leads away from the herein-claimed method by causing

precipitation before the spraying step. The case of In re Wagner, 152 USPQ 559 (1967), and its progeny, stand for the proposition that prior art that leads away from the invention does not render the invention unobvious.

In reference to the above, Examiner should consider the following sketch of Peterson's method and comments that follow:



The Peterson reference has to add organic complexants (e.g. urea and carbohydrazide) to form a molecular glass prior to spraying. Obviously the Petersen reference does not have a solution at this point prior to spraying, but instead a molecular glass. We do not

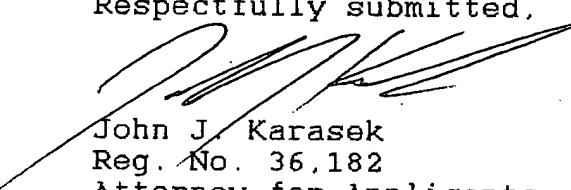
form a molecular glass surrounding the particles prior to spraying. Our claim 1 leads away from making a molecular glass. After spraying, Peterson creates a particle coated with molecular glass. We do not do this, but instead spray a particle coated with the precursor or coating solution.

Entry of this amendment is requested since it will place the case in a better form for appeal.

On entry of this amendment, it is requested that claims 1,3-8,10-13 and 15-20 be allowed and the case be passed to issue. If this amendment is not entered into the record, allowance of claims 1,3-8 and 10-20 is requested. Should rejection of the claims be maintained, enclosed is a Notice of Appeal of claims 1,3-8,10-13 and 15-20 if the amendment is entered or claims 1,3-8 and 10-20 if the amendment is not entered. Please charge our account # 50-0281 with the appropriate Notice of Appeal fee.

Enclosed also is a marked-up version of the changes made to the specification and claims by the current amendment. The attachment is captioned 'Version with markings to show changes made.'

Respectfully submitted,



John J. Karasek
Reg. No. 36,182
Attorney for Applicants

Prepared by George A. Kap
Reg. No. 22,898
Tele.: (703)-404-1555

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the specification:

Paragraph beginning at line 3 on p.9 has been amended as follows:

In order to fully coat the particles or provide complete hermeticity, it may be necessary to coat the particles more than once. Also, particles of the coating material, can also be present since volume of the coating material on a particle is unexpectedly high. To demonstrate the unexpectedly high volume of the coating material on a coated particle, a 90 nm thick coating on a 5-micron particle is equivalent to about a micron particle of the coating material. Particles of the coating material, as well as uncoated particles, also decrease efficiency and brightness of a batch of coated particles containing a preponderance of coated particles where the coating material is different from the particles and a lesser amount of uncoated or partially coated particles and particles of the coating material. Particles of the coating material are significantly reduced by this method [method].

Paragraph beginning at line 13 on p.9 has been amended as follows:

The coating method of this invention includes the steps of dissolving a coating precursor material in a solvent to form a precursor solution; optionally adding with mixing a miscible diluent to the solution to form a coating solution; adding with mixing solid particles to the coating solution or the precursor solution to form a coating slurry, with the particles surrounded

with the coating solution or the precursor solution; adjusting temperature, pH and/or another parameter to discourage precipitation on the particle surface; delivering the slurry to an atomizer without separating the particles from the coating solution or the precursor solution; atomizing or spraying the slurry in the form of droplets through a drying zone to remove volatile matter from the surface of the particles, with the droplets containing at least one particle; heat- treating the coated particles; and collecting the heat-treated coated particles.

In the claims:

Please delete claim 14 and amend claims 1,4,5,16,17 and 20 as follows:

1. (Twice Amended) A method for coating solid particles comprising the steps of

(a) adding solid particles to a liquid coating solution or precursor solution to form a liquid coating slurry containing a coating precursor, solvent for the precursor and the solid particles dispersed therein whereby the precursor is not precipitated until after spraying. (b) spraying the coating slurry to form droplets containing at least one particle,

(c) passing the droplets through a zone where the droplets are dried and form dry coated particles wherein the coating material is formed from the coating solution or the precursor solution, and

(d) heat treating the coating material on the particles to

remove volatile matter from the coating material.

4. (Twice Amended) The method of claim 3 wherein the particles are less than about 100 microns in diameter, dilution ratio in the coating slurry of milliliters of coating solution or precursor solution per gram of phosphor particles is 100-5000, thickness of the coating material on the particles is 1-1000 nm, velocity of the droplets in the zone is 0.1-1000 cm/sec in the droplet direction and residence of the droplets in the zone is from instantaneous to a fraction of a minute.

5. (Amended) The method of claim 3 wherein the particles are less than about 50 microns in diameter, temperature in the zone is 100-500°C, dilution ratio in the coating slurry of milliliters of coating solution or precursor solution per gram of phosphor particles is 200-3000, thickness of the coating material on the particles is 2-200 nm, velocity of the droplets in the zone is 1-50 cm/sec in the droplet direction, and residence time of the droplets in the zone is 0.1-10 seconds.

16. (Amended) The method of claim 15 wherein the particles are less than about 100 microns in diameter, dilution ratio in the coating slurry of milliliters of coating solution or precursor solution per gram of phosphor particles is 100-5000, thickness of the coating material on the particles is 1-1000 nm, velocity of the droplets in the zone is 0.1-100 cm/sec in the droplet direction and residence of the droplets in the zone is from instantaneous to a fraction of a minute.

17. (Amended) The method of claim 16 wherein the particles are less than about 50 microns in diameter, temperature in the zone is 100-500°C, dilution ratio in the coating slurry of milliliters of coating solution or precursor solution per gram of phosphor particles is 200-3000, thickness of the coating material on the particles is 2-200 nm, velocity of the droplets in the zone is 1-50 cm/sec in the droplet direction, and residence time of the droplets in the zone is 0.1-10 seconds.

20. (Twice Amended) The method of claim 13 wherein said heat-treating step is carried out at 300-1500°C over a period of 0.1-24 hours and wherein the coating material is selected from the group consisting of indium tin oxide, silicon dioxide, magnesium oxide, sodium phosphate, yttrium-europium oxide, and mixtures thereof; and the precursor solution includes a precursor material selected from the group consisting of indium methyl (trimethyl) acetyl acetate, tin isopropoxide, tetraethyl orthosilicate, magnesium nitrate, yttrium chloride, europium chloride, sodium phosphate and mixtures thereof.